

# Exploring Smartphone Applications for Effective Mobile-Assisted Language Learning

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Kim, Heyoung & Kwon, Yeonhee. (2012). Exploring smartphone applications for effective mobile-assisted language learning. *Multimedia-Assisted Language Learning*, 15(1), 31-57.

The widespread use of smartphones has brought numerous mobile applications to L2 learners, but discussion about its effectiveness has not been settled yet within the field. This study attempts to broaden this discussion by reporting the findings of an in-depth review of 87 ESL mobile apps. Two research questions are addressed to explore this issue: 1) What are the common and distinctive features of smartphone applications? 2) What are the strengths and weaknesses in utilizing present smartphone applications for effective mobile-assisted language learning (MALL)? This study first suggests evaluation criteria designed for mobile-based ESL software. Next, overall features and functions of the selected applications are analyzed in the three categories: 'content and design', 'L2 approaches' and 'technology'. The details of the findings are sorted and explained by target language skills. Finally, this study concludes that the ESL apps seem effective in that they provide a personal and learner-centered learning opportunity with ubiquitously accessible and flexible practices. However, they need to be improved by realizing mobility as a more situated, field-dependent, and collaborative form of learning. The effective design and use of ESL mobile applications should continue to be studied in order to suggest the right direction to effective MALL.

## I. INTRODUCTION

The popularity of mobile devices has changed the way we learn, communicate, and live. New technologies such as social networking, podcasting, or speech recognition embedded in mobile applications accelerate the changes occurring in Mobile-Assisted Language Learning (MALL) environments by extending learning opportunities and reshaping learning styles. The widespread use of smartphones has brought millions of mobile applications to L2 learners. Some questions, however, still need to be fully discussed: “Are they effective from L2 perspectives?” “What is an effective design like for MALL?”

Some researchers (Chinnery, 2006; Kukulska-Hulme, 2009; Kukulska-Hulme & Shield, 2008) have researched and discussed MALL, but, only incidentally, as a part of large studies looking at Computer-Assisted Language Learning, but some unique features distinguish MALL from other types of computer-based learning (Kukulska-Hulme & Shield, 2008). The success of MALL depends on whether or not MALL curriculum and material developers understand the nature of mobile learning and make the most effective use of MALL technology.

The purpose of this study is to deepen this discussion with extensive, updated information regarding currently available ESL mobile applications (apps). This study reviews over a hundred smartphone apps that were designed for ESL learners; 87 of these were then selected for further in-depth analysis. This study adapted the work Hubbard (1988, 2006, 2011) did in his study “Integrated Framework for CALL Courseware Evaluation,” (Hubbard, 1988, 2006, 2011), to provide an analytical framework to look at design and evaluation criteria for mobile based ESL software.

From both quantitative and qualitative analysis of data, this study presents 1) the overall patterns of common and distinctive features of ESL mobile apps; 2) the details of these features and functions were then examined as their effectiveness on specific language skills. Finally, this study discusses the strengths and weaknesses of current ESL learning apps from a pedagogical and technological perspective and suggests the directions which might lead toward effective development of future MALL.

The research questions that guided this investigation are:

1. What are the common and distinctive features of smartphone applications appeared from analysis?
2. What are the strengths and weaknesses in utilizing present smartphone applications for effective MALL ?

## II. BACKGROUND

### 1. What is Effective MALL?

#### 1) The Concept of Mobile Learning

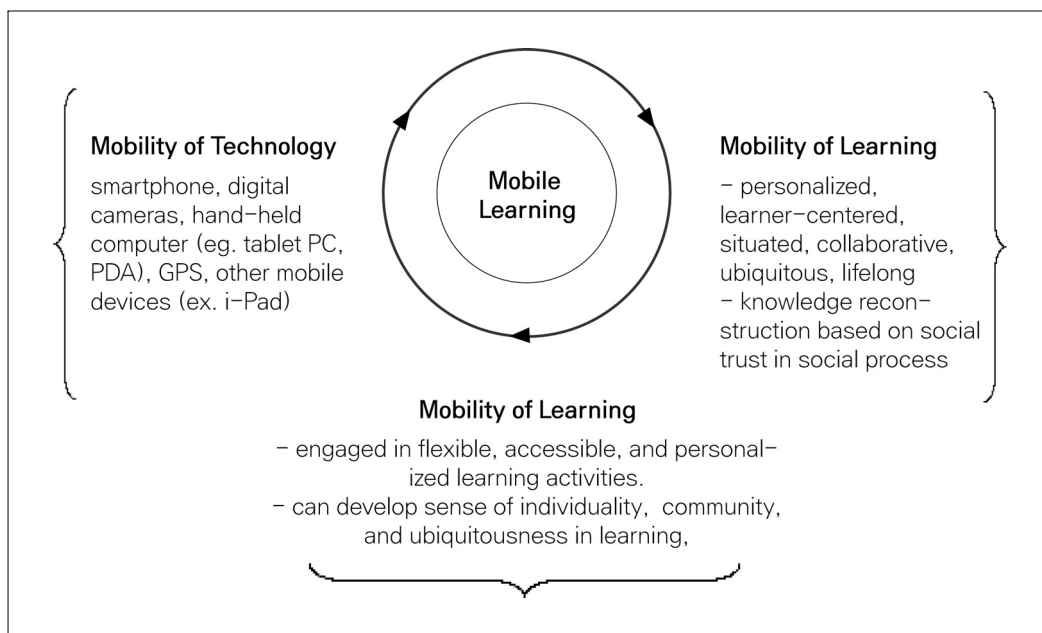
The popularity of mobile devices has been rapidly changing learning, communicating, even our very life styles. Use of mobile technologies remarkably extends learning opportunities, needs, goals, and have profound effect on many learning activities and learning styles. Despite this ubiquitous presence, there is yet no agreed-upon definition of ‘mobile learning’ or ‘m-learning’. Many researchers have emphasized “mobility” of mobile learning (Kukulska-Hulme, 2007; 2009; Sharples, 2006; Traxler, 2007). Mobility needs to be understood not only in terms of spatial movement, but also the ways in which such movement may enable time-shifting and boundary-crossing (Kukulska-Hulme, 2009, pp. 158-159). Kloper, Squire, and Jenkins (2002) attend to five unique educational properties of mobile devices which precisely describe mobility aspects of m-learning: portability, social interactivity, context sensitivity, connectivity.

El-Hussein and Cronje (2010) succinctly define the concept of mobility in three significant areas: *mobility of technology, mobility of learning, and mobility of learner*. In mobility of technology, mobile technology includes smartphones, digital cameras, hand-held computers (e.g. table PC, PDA), global positioning system (GPS) devices or other mobile devices that are furnished with wireless application protocol (WAP), or Wi-Fi. These technologies deliver content and instruction through the Internet or satellites, that can enable learners to learn anywhere, anytime. Mobile technology also enables users to perform many different kinds of social-interactive functions including communication (phone, SMS, SNS, email), organization (memos, address or calendars, other utilities), applications (e-books, database, tools, and office), information (webs, references) or relaxation (camera, music, movies, or games) (Trinder, 2005).

Mobility of learning also generates new modes of educational delivery: personalized, learner-centered, situated, collaborative, ubiquitous, and lifelong learning (Sharples, Taylor & Vavloula, 2005). The mobile learners can have very personal and unique experiences within the context they are situated. There is neither limitation nor privilege with regard to age, place, time or duration. The learners can easily connect with each other for their own purposes and interests. The way they construct, organize and reconstruct knowledge is based mainly on social trust (Globeck, 2006, 2009) in the context of the social process.

Finally, mobile learning enhances the mobility of individual learners. Learners usually

take the advantage of their learning to facilitate productivity and effectiveness, allowing them to be more flexible, accessible, and to personalize their learning activities. Environments for new learning modes should engage them in their ongoing learning activities and enhance their productivity and effectiveness. Learning advantages such as more flexible, accessible, and personalized learning activities provide this engaging encouragement (Ting, 2005). The mobile learners can develop sense of individuality, community, and ubiquitousness in learning, which might bring them the enjoyment of having a certain amount of freedom and independence. Figure 1 shows the concept of mobile learning in higher education summarized in the previous studies.



[Figure 1] The Concept of Mobile Learning in Three Areas

## 2) Mobile-Assisted Language Learning

Since the term mobile-assisted language learning (MALL) was first coined by Chinnery (2006), the use of mobile devices to support language learning has increased exponentially. Although, in general, MALL has been considered as a subset of both mobile learning and computer-assisted language learning, Kukulska-Hulme and Shield (2008) note that MALL differs from CALL “in its use of personal, portable devices that enable new ways of learning, emphasizing continuity or spontaneity of access and interaction across

different contexts of use” (p. 273).

The literature summarizes the benefits of using MALL as follows. First, MALL enables students to more easily and more promptly access language learning materials and communicate with people at anytime, from anywhere. Second, the nature of digital technology facilitates students’ participation in both collaborative and individualized language learning activities synchronously and/or asynchronously allowing rapid development of speaking, listening, reading, and writing, skills. Third, mobile technology provides various resources and tools for language learning that encourage learners to be more motivated, autonomous, situated (site-specific), and socially interactive.

Numerous studies have reported on the use of mobile devices being used to develop language skills in the last few decades. Thornton and Houser (2005) used mobile phones for English vocabulary lessons and asserted that, compared with paper, and computer-based lessons, mobile-learners perceived more and preferred learning with mobile phones. Levy and Kennedy (2005) also implemented short message service (SMS) for Italian vocabulary instruction to send word knowledges and to request feedback. 94.4% students responded positively to the project. Kiernan and Aizawa (2004) explored using mobile phones for task-based language learning and concluded that incorporating tasks can promote L2 acquisition and make learners focus on meaning. Cho (2009) and Lee (2010) indicate that smartphones enable the combination of multimedia and the web and heighten the learners’ autonomy and collaboration.

## 2. Mobile Application Services for MALL

### 1) Mobile Social Networking/ Mobile Social Software (MoSoSo)

Most of Social Network Service (SNS) applications, such as Facebook, Twitter, YouTube, or Flickr, were introduced with compact designs but with almost identical functions in mobile platforms/ These were often lumped into a category which we now refer to as mobile social networking or mobile social software (MoSoSo). MoSoSo extends social networking to the mobile environment.<sup>1)</sup> Lugano (2007, 2008) indicates that the marriage of computer and mobile networks provides opportunities for a synergy among SNS and MoSoSo, supporting social networking activity anytime and anywhere. In this context, MoSoSo upgraded the original mobile services from interpersonal to network interactions through the many-to-many communication paradigm and diversified purposes and needs for mobile communication making it possible to integrate and coordinate them

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1) *Kakao talk*, *Dodgeball* or *Foursquare* are a few selected examples of numerous MoSoSo.

into everyday life.

Previous studies of SNS regarding L2 learning attend to interaction and collaboration in SNS (Lomicka and Lord, 2009; Kim, 2010; Kim, Park, & Baek, 2011). For example, Kim (2010) investigated three EFL teachers' use of *Twitter* for their instruction for three weeks and found that three teachers had built extended interaction and rapport with their students, but their interaction patterns were different by teachers' L2 beliefs. Kim, Park, and Baek (2011) explored the uses of microblogging among three different EFL student groups (Grade 5, 7, and 11) and reported that the use of *Twitter* boosts learners' output and encourage relationships with other users. Some negative results were also reported in SNS-integrated class such as some ontological conflict between the instructor and students, reduced achievement, and a lesser sense of belonging and recognition (Cho, 2009).

## 2) Mobile Podcasting/ Mobilecast

A mobilecast is “a podcast designed to be downloaded or streamed to a mobile phone”<sup>2)</sup>. Most of the recent smart phones contain audio and video devices, web 2.0 technology and huge storage capacity, so podcasting services can be run on the portable devices as easily as on a PC. These kinds of devices, however, tend to lend themselves better to more brief information, such as news headlines or short movie reviews due to the limits of speed and screen size. Since mobilecast is more prompt and more hands-on than PC-based podcasting, it can be a powerful multimedia learning tool, again, because it is “ready-to-use anytime and anywhere”.

Ideas of integrating podcasting into language learning have been reviewed by many researchers. Cho (2006), O'Bryan & Hegelheimer (2007), Stanley (2006), and Thorne and Payne (2005) found that podcast provides authentic materials, so it is an effective supplement to textbooks. Cho (2007) also presents that podcasting enhances learners' intrinsic motivation and facilitates their collaborative learning process through meaning negotiation.

## 3) Course Management Service (CMS)

Course management service is software designed to create online courses within which learners and teachers can converse with each other and be engaged in collaborative construction of content. Houser and Thornton (2005) proposes Poodle, a

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2) quoted from Wikipedia, <http://en.wikipedia.org/wiki/Mobilecast>

course-management system designed to facilitate deploying education materials to mobile phones. Poodle is an important step towards the standardization of mobile phones in education, in that it supports ubiquitous polls, quizzes, wikis, forums, and flash cards. Milovanović, Minović, Štavljanin, and Starčević (2008) suggest enabling students to access Moodle CMS on the go. Their research developed Moodle extension for mobile users. They found clear advantages of using core Moodle functions via mobile devices, Shen, Wang, and Pan (2008) assert that CMS helps to create a student-centered learning environment in which students can participate and feel they play an important role.

#### 4) Automatic Speech Recognition (ASR)

Voice-recognition software has been reviewed as a tool for language learning since 80s. Numerous ESL software has been embedded in ASR devices for more interactive oral practice. Recent advances in mobile technology makes speech processing technology possible by improving on the limitation of storage, memory, and speed of wireless phones. Voice-recognition apps enable voice dialing, or automatic translating. *Dragon dictation* and Nuance offer microblogging or text-messaging by voice. Voice translating apps such as Jibbiggo translates words, phrases and simple sentences, allowing two parties to peak alternately. ASR-based apps, such as Bing, Google Voice, Vlingo, or Siri Assistant also function as automatic hands-free task processing engines.

### III. RESEARCH METHODS

#### 1. Applications to Review

This study deals with iPhone applications for learning English searched by a keyword in *iTunes*<sup>3)</sup>, a media player computer program that manages content on the Apple<sup>4)</sup> smart devices, products supported by mobile platform called iOS..

The reason to choose *iOS* is because this study is intended to focus more on global trends of mobile application use. According to the Gartner Report<sup>5)</sup> (August, 2011) the current market share of smartphone platforms reveals that 43.4% for Android, 18.2% for iOS, and 22.1% for Symbian. However, Symbian provides a very limited number of apps

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3) <http://www.itunes.com>

4) <http://www.apple.com>

5) <http://www.gartner.com>

(2); the number of Android applications (250) is also far less than that of *iOS* (499) in searching of keyword, ‘ESL.’ In addition, Android ESL apps were pretty much overlapped with *iOS* ones. Therefore, it seems statistically relevant to say that *iOS* apps can represent the overall trend and features of current apps in the ESL field.

From the primary search, 499 applications were found using the keyword, ‘ESL.’ Among them, this study filtered out 87 applications using the following procedure (Table 1). First, this study excluded applications targeted at learners of specific languages, such as Koreans, Chinese, Japanese, French, and so forth. Second, only one application was selected out of the multiple versions of one company because, when analyzed, it was found that they share almost the same design features.

[Table 1] Number of Smartphone Applications by Language Learning Areas

Focused Skills	Number of Applications	Mean Percentage	Paid	Free
Vocabulary	37	42.5	23	14
Grammar	11	12.6	10	1
Listening	10	11.4	4	6
Reading	15	17.4	10	5
Speaking	8	9.1	6	2
Writing	5	5.7	5	0
Total	87	100	59	28

## 2. Analytical Framework of MALL

This study employs Hubbard’s widely used software review criteria, “Integrated Framework for CALL Courseware Evaluation” (1988, 2006, 2011) as the basis of an analytical framework. However, since this framework was designed for courseware and PC-based learning, this study modified it by adding and deleting some elements and criteria and narrowing down the scope of the framework in order to better fit in mobile-assisted language learning environments and devices. The revised framework has three categories: *Content/Design Target*, *Procedure and Approach*, *Technological Features*.

In *Content/Design Target*, this study attempts to identify intended users’ profile and their learning from the applications. This includes mostly elements of Hubbard’s ‘Learner fit’. In this category, target learners, content, learning styles and strategies were analyzed from L2 learners’ perspectives.

*Procedure & Approach* analyzed mobile apps from pedagogical and SLA perspectives. This covers activities, focus, and methodological approaches, which incorporates ‘Activities’



and ‘Teacher fit’. Since mobile apps were mostly designed for individual learning, some questions in Hubbard’s regarding teachers and curricula were excluded.

*Technological Features* includes four elements, simplicity of direction and usage, platform compatibility, multimedia, and exploitation of computer potential. Each item has mobile-fit questions including web 2.0 technology and currently available platforms. The further detail in this framework is described in Table 2.

[Table 2] Analytical Framework of Mobile-Assisted Language Learning

<b>■ Content/Design Target</b>
• Target Learners
- age (children, young adult, adult)
- interest (general, ESP)
- proficiency level (beginner, intermediate, advanced)
• Content
- topic
- organization
- content size (number of units, topics, sentences, words, etc)
• Learning styles (recognition, recall, comprehension, experiential learning etc.)
• Learning strategies (field-dependent/independent, deductive/inductive reasoning, collaborative, etc)
<b>■ Procedure &amp; Approach (Pedagogy and SLA)</b>
• Activities
- Instructional (tutorials, drills, text(voice) reconstruction)
- Individual (test, quiz, game)
- Facilitative (dictionary, database, verb conjugator, spell/grammar checker, pronunciation)
• Focus
- Linguistic focus (discourse, lexis, grammar, spelling, pronunciation)
- Language skill focus (reading, listening, writing, speaking)
- Sociolinguistic focus (form/meaning focused, information gathering, authentic tasks)
• Methodological approaches (audio-lingual, situated, task-based, structural etc)
<b>■ Technological Features</b>
• Multimedia (videos/ graphics/Sound/Music/Resolution Size )
• Exploitation of mobile potential
- Other Functions (memo pad, voice recording, speech synthesizing, speech/text recognition)
- Web 2.0 features (SNS, wiki, blog, podcasting etc.)

### 3. Procedure

The application review of this study can be considered as ‘judgemental’ analysis of software evaluation (Chapelle, 2001, p. 54). According to Chapelle (2001) “the judgemental analysis should examine characteristics of the software and task in terms of criteria drawn from research on SLA” (p. 54). The study was conducted by analyzing the data both quantitatively and qualitatively in the following manner. First of all, the researchers searched the applications with the keyword *ESL* in iTunes and reviewed them by reviewing the description. Next, the applications were selected based on the following criteria. They should be 1) designed for ESL only 2) written in English, 3) include some instructional devices (tutorial, scaffolding, or direct instruction). More than 100 applications, including both free and paid versions, were downloaded and reviewed to carefully select the appropriate target materials. The free versions were chosen from the multiple series made by the same publishers. The researchers finally chose 87 target applications. Third, the applications were sorted by focus skills, and then each application was both qualitatively reviewed and quantitatively coded by all the items of the evaluation criteria (Table 2). *MS Excel 97* was utilized to create a systematic and easily assessable log. Fourth, each skill area was recorded both on the separate and the same index sheet for data triangulation, and the researchers reviewed the logs by alternatively going over the data between two sheets to compare and contrast them with other skill areas. For general pattern finding across the skills, the analysed data were integrated, repeatedly reviewed, and counted in the three major themes, ‘Content/Design Target,’ ‘Procedures and Approaches,’ and ‘Technological Features.’ Decision Tree Analysis (DTA, Han & Kamber, 2001) was used for knowledge discovery or data mining. DTA enhanced qualitative process by allowing the researcher to analyze the quantitative data (Castellani & Castellani, 2003, p. 1009).” Each app in a tree has many branches that describe features of evaluation items in three categories, which helps to shape common properties by groups. Finally, for descriptive statistical results, the researcher used automatic formula or “find word” in *MS Excel 97* to calculate the total numbers and the percent rates.

## IV. RESULTS

### 1. Features of Current ESL Mobile Applications

#### 1) Content/Design Target

##### (1) Target Users

The target users of the applications are mostly adults or young adults (81%). Only 19 % of selected applications were designed for children. This seems closely related to the population of smartphone owners. The assumed proficiency level varies from beginning (22%), intermediate (47%), to advanced (30%). They were fairly well-balanced across language skills, except writing apps which were all targeted at advanced learners. The target users are considered to have general interest in learning English, and the limited number of applications offers content for special interest group such as business English or English test preparation.

##### (2) Content

The organization and study features have distinctive patterns according to the target language skills. Most of the apps require *cognitive* learning style such as learning styles of recognition (31%), recall (29%), comprehension (31%), rather than socio-cognitive (ex. experiential learning (12%).

#### 2) Procedures and Approaches

##### (1) Activities

The activities of the ESL apps are analyzed to be ‘not well developed’ and also ‘traditional’. They seem quite different from the concept ‘mobility of MALL’ in El-Hussein and Cronje (2010). Almost the half of the apps offer listed language data only, no recognized instruction. The instructions of the other half are nearly teacher-directed such as tutorials (75%) or drills (40%). Only 17.5% of them are learners’ own reconstruction of text or voice. Quite a number of applications (40.6%) include individual activities such as games or tests. There was no attempt to encourage or facilitate collaborative learning. However, many of them are facilitative for independent language learning by providing good scaffolding devices such as word dictionaries, spell checkers, hyperlink, pronunciation, or other reference databases.

## (2) Focus

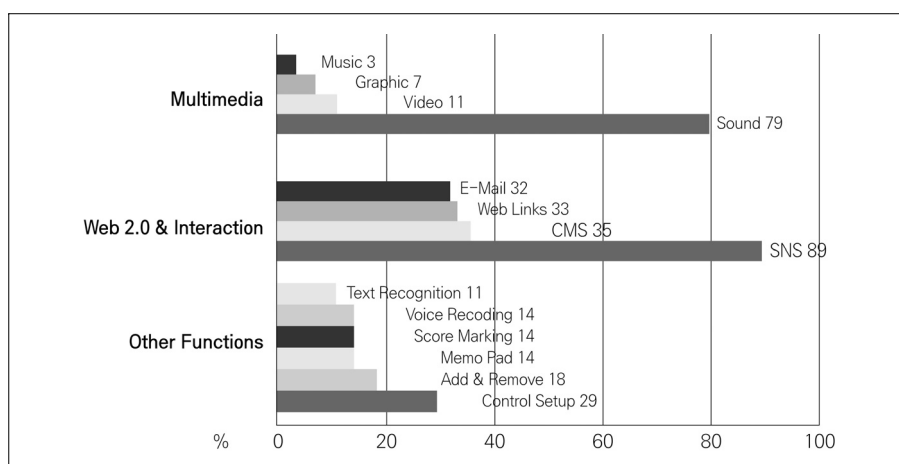
The major focus of ESL mobile applications is words. Across all applications, 55% have activities for vocabulary learning and vocabulary applications takes 41%. From the data analysis, other linguistic foci such as spelling or pronunciation are also closely related to developing word knowledge. The other language skills in the list are reading (15), grammar (11), listening (10), speaking (8), and writing (5) in order. The findings support the fact that the current mobile apps focus more on receptive language skills than productive, and present more form-focused short language information. Culture (15%) or authentic context (9%) were not much highlighted.

## (3) L2 Methodological Approaches

Although some apps do not have any recognizable methodological approaches, there were various patterns yielded from the data analysis from L2 perspectives. The most frequently employed approaches are task-based (28) (mostly cognitive tasks such as problem-solving) and audio-lingual (27), situational (6), or structural (6) approaches have been also taken.

## 3) Technological Features

Figure 2 shows the technology use in the reviewed applications. It was analyzed that the most frequently employed multimedia feature was sound and video. Most of the apps include the connection to SNS, but with no specific study purpose. Results clearly show that recent mobile technologies such as speech recognition or text recognition, or other



[Figure 2] Multimedia and Exploitation of Mobile Potential

web 2.0 tools, were not embedded, or embedded without much consideration of MALL.

## 2. Further Analysis of ESL Apps by Language Skills

### 1) Vocabulary (37)

#### (1) General Learning Features

Vocabulary apps mostly have similar content designs, namely, ‘word list presentation’. However, their target learners’ profile and difficulty level vary in terms of age, interest, and proficiency level as in Table 3.

[Table 3] Students’ Profile of Vocabulary Applications

	Age		Interest		Proficiency Level			
	Children	Young Adults	Adults	General	Specific	Beginner	Intermediate	Advanced
N	7	24	6	31	6	8	15	14
%	18.9	64.8	16.2	83.7	16.2	21.6	40.5	37.8

From the data analysis in Table 4, the most dominant organization type is the word list with its definition and example sentences. A few applications provide list of quizzes, tests, and game for enhancing learners’ comprehension and self-checks. Noticeably, many apps (56.7%) have topics, which probably provides users with more context and motivation.

[Table 4] Content of Vocabulary Applications

	Topic		Organization						
	Yes	No	Word List + Definition + Examples	Tests	Game	Word List +Tests	Word List +Game	Word List +Quiz +Game	Resource + Quiz + Game + Media
N	21	16	23	6	1	3	1	2	1
%	56.7	43.2	62.1	16.2	2.7	8.1	2.7	5.4	2.7

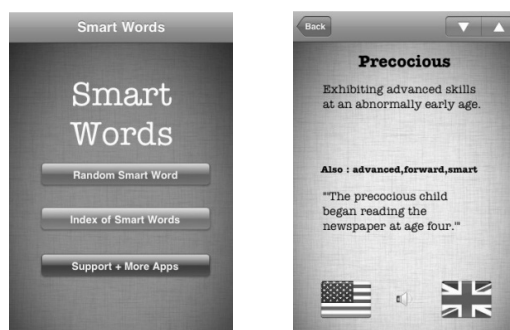
Learners can also selectively choose lexical categories, vocabulary and idioms, and 80% of applications employ at least two types of learning styles and all of them require ‘recognition.’

[Table 5] Study Feature and Learning Style of Vocabulary Applications

	Study Feature			Learning Styles				
	Words	Idioms	Both	RC	RC+RE	RC+CO	RC+RE+CO	RC+RE+CO+EX
N	24	8	5	6	10	13	5	2
%	72.9	48.6	13.5	16.2	27	35.1	13.5	5.4

Note: RC: Recognition RE: Recall CO: Comprehension EX: Experiential Learning

One of the prototypical examples is *Smart Words*. From the main page, learners can either start learning the list of words or search for specific words. *Smart Word* presents each word on one page with a definition, an example, and two audio files for pronunciation: American English and British English.

[Figure 3] The Screenshots of *Smart Words*

## (2) L2 Approaches and Methodological Concerns

From the data analysis, vocabulary apps can be described as “various technology uses and scaffolding devices, but traditional L2 approaches.” As shown in Table 4, most vocabulary apps seem to function as self-study reference rather than formal instruction. Only a few apps (9) offer some tutorials or drills. The majority of these apps were designed for individual learning. Very few attempts were made for collaborative learning. Many, however, have excellent facilitating devices, such as pronunciation (14), additional databases (15), videos and graphic for visual aids (4), or bilingual translations by actively using various new technologies, such as SNS<sup>6)</sup>, voice recording, YouTube<sup>7)</sup>, GPS<sup>8)</sup>.

L2 approaches were not very diverse and were mostly traditional. Most frequently

6) Just vocabulary, World Glide, Idiom attack

7) Idiom attack

8) American Idioms

found methodologies were audio-lingual (14) or task-based (10). Tasks were mostly finding answers to the questions, and none of them provide other types of tasks in Task-Based Learning. Some apps (2) attempt to provide lesson by situation.

## 2) Grammar(11)

### (1) General Learning Features

Grammar applications are developed mostly for young adult learners (72%) of the intermediate level (81%). Thus, they all focus on general learning purposes. Most applications deals with all the topics of English grammar. They are mostly two types, text-based grammar instructions or grammar tests/quizzes. To heighten learners' awareness, one application provides both types.

[Table 6] Topic and Organization of Grammar Applications

	Verb Tense	Topic			Organization	
		All Topics	Others	Tests	Text-based grammar instruction	Test+Text-based grammar instruction + Context
N	2	8	1	7	3	1
%	18	72	9	63.6	27.2	9

Most of the apps include comprehension learning style. Although they apply grammar contents in the “bite-size” screen, they tried to involve more than two learning styles.

[Table 7] Learning Style of Grammar Applications

	RC	RE	CO	RE+RC	CO+RE	CO+EX	CO+RC+RE	RC+RE+CO+EX
N	1	1	2	2	1	2	1	1
%	9	9	18	18	9	18	9	9

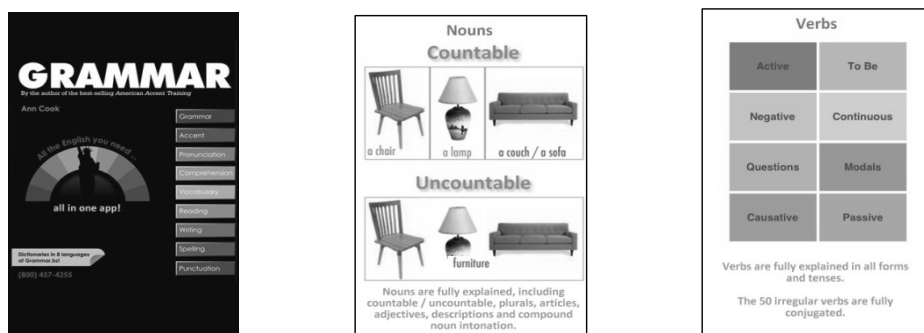
Note: RC: Recognition RE: Recall CO: Comprehension EX: Experiential Learning

### (2) L2 Approaches and Methodological Concerns

Most of the grammar apps are considered as formal instruction. Eight apps out of 11 have tutorials or drills. Four applications (36%) even serve activities to reconstruct texts. In addition, they provide pronunciation, words, or other linguistic knowledge as well as grammar and other integrated skill practices, reading(11), listening(3), speaking(1) or writing(1)<sup>9</sup>.

The methodological approaches in grammar apps also remain traditional. The lesson

was given by structural unit, and then tests were provided. Some learner-centered functions such as “add/remove,” “mark favorites,” automatic scoring, memo pad, or voice recording were recognized in a few apps. One noticeable attempt is *Grammar A-Z*. As shown in Figure 4, it presents comprehensive grammar instruction, with various exercises context, quizzes, and four integrated skills. Good scaffolding utilities such as a voice recorder, memo pad, and a dictionary for many different L1 users, including Korean, Japanese, Hindi, English, Russian, Spanish and Vietnamese.



[Figure 4] The Screenshots of *Grammar A-Z*

### 3) Listening (10)

#### (1) General Learning Features

There are numerous potentially effective language learning applications for listening such as many audio or video-uploaded podcasting, but the selected listening apps were designed particularly for ESL. Listening applications present meaning-based resources with various topics mostly focusing on a particular group, young adult learners (90%) of intermediate level (89%).

The content is all diverse, authentic, and well scaffolded with transcripts (6) or subtitles (3). The design of the content was basically identical in most listening apps, which is “providing listening files and comprehension questions.”

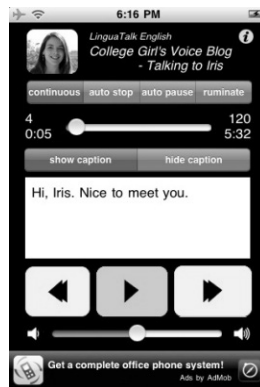


[Table 8] Content and Learning Styles of Listening Applications

	Organization			Learning Style			
	Listening+ Transcript	Listening+ Subtitle	Test	CO	CO + RE	CO + RC	CO+RE+RC
N	6	3	1	4	3	1	2
%	60	30	10	40	30	10	20

Note: RC: Recognition RE: Recall CO: Comprehension

For example, *College Girl's Voice Blog* presents about a 5–10 minute authentic speech with subtitles that can be shown or hidden by the control button. Users can develop listening and reading skills simultaneously. The content is meaning-based regarding college cultures in America.

[Figure 5] The Screenshots of *College Girl's Voice Blog*

## (2) L2 Approaches and Methodological Concerns

All the reviewed apps provide meaning-based instruction, and half of them include cultural context. Three apps sequence the content by situation base, and two applications highlights communication practice. An audio-lingual method is still portrayed in some applications' contents (4). Due to listening focus and technological restrictions, there was not much interaction between users or between users and their mobile apps. Only one app allows voice recording and another app presents video file. Only two apps provide SNS service, but not for the purpose of communicative exchanges.

Their linguistic focus mostly covers discourse and pronunciation of word or sentence level, but some apps also deal with word spelling (3) and grammatical elements (4) from the listening scripts. Further scaffolding such as resources or links to topic-related information was not found.

#### 4) Reading (15)

##### (1) General Learning Features

There are numerous e-book apps and other apps for authentic reading purposes such as news or websites. This study reviewed only reading apps for ESL learners. Unlike, when looking at the listening features of apps, reading applications were analyzed from a general interest perspective for all age and proficiency groups.

[Table 9] Students' Profile of Reading Applications

	Age			Interest		Proficiency Level		
	Children	Young Adult	Adult	General	Specific	Beginner	Intermediate	Advanced
N	5	6	4	14	1	5	5	5
%	33	40	26.6	93.3	6.6	33.3	33.3	33.3

The topic and genre of their reading texts were diverse; for example, fairy tales (2), news (1), dramas (1), novels (1) etc. Most reading apps (11) also provide audio files, and some of them (2) even provide text with videos.

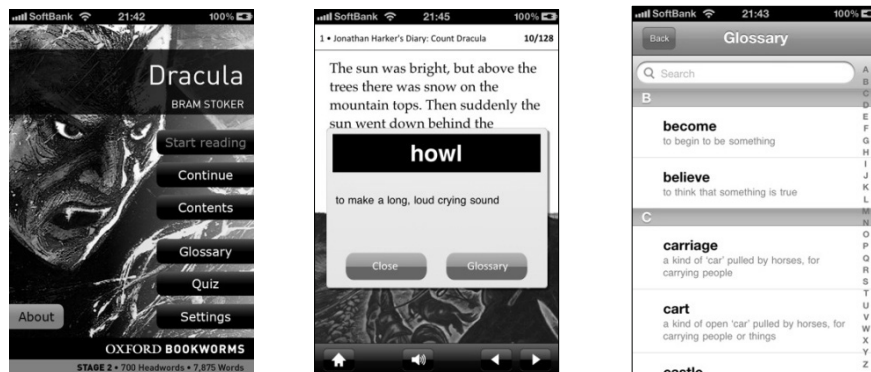
One third of the applications provide input enhancement functions for users. When learners listen to the audio files of the text, the words of the text are highlighted or underlined in sync with the recorded voice. One app includes a caregiver's guide for the children's reading practice. Similar to listening reading apps also require a variety of learning styles, recognition, recall, experiential learning, as well as comprehension.

[Table 10] Study Feature and Learning Style of Reading Applications

	Input Enhancement			Quiz/Test	Tutorial Note	Guide	Summary
N	5			4	1	1	1
%	33			26.6	6.6	6.6	6.6
	CO	RC	CO+ RC	CO+EX	CO+RC+RE	CO+RC+EX	CO+RC+RE+EX
N	4	3	3	1	1	1	2
%	26.6	20	20	6.6	6.6	6.6	13.3

Note: RC: Recognition RE: Recall CO: Comprehension EX: Experiential Learning

As a good example, *Oxford Bookworms Library* series provides eBook apps with original illustrations, audio files, glossaries, and word quizzes. They provide apps with two different sizes for iPad and iPhone.



[Figure 6] The Screenshots of Dracula: Oxford Bookworms Library (i-phone size)

## (2) L2 Approaches and Methodological Concerns

Only a few L2 approaches were found in reading categories; expectedly. Most prominent was bottom-up reading because most reading apps offer word exercises only, and users are expected to read the story while listening to the audio file. Reading and listening skills can be developed at the same time, but there was no instruction or guide for learners. There are two scaffolding devices for L2 readers. First, the target words are linked to the glossary and printed in red. Second, a picture is given for each page that describe the scene. There is no activity from any apps that guide the pre- or post-reading process.

## 5) Speaking(8)

### (1) General Learning Features

The majority of speaking applications are targeted at young adults or children. However, their interests and topics vary for the age group of the intermediate or lower proficiency level: pronunciation (3), tongue twister (1), phonics (2), ESP (2), test preparation (2). 50% of the apps require learners to use recognition and recall. The way they organize the lessons is also noticeably diverse; providing questions and answers, model practice, audio video tutorials, or animated simulation etc.

[Table 11] Students' Profile of Speaking Applications

	Age		Interest		Proficiency Level			
	Children	Young Adult	Adult	General	Specific	Beginner	Intermediate	Advanced
N	2	5	1	4	4	3	4	1
%	25	62.5	12.5	50	50	37.5	50	12.5

[Table 12] Content of Speaking Applications

	Topic					Organization			
	Pronunciation	Phonics	ESP	Tongue twist	Test Prep	Picture/Letter	Tutorial	Example sentence	Test
N	3	2	2	1	2	2	2	1	1
%	37.5	25	25	12.5	25	25	25	12.5	12.5

Note: ESP: English for specific purposes

More than half of the selected apps provide voice recording for accuracy development. They were designed mostly for individual practice. Simulations (3) and quizzes (1) are included in some apps.

*IELTS Speaking Success* is the most recognized in this category. It consists of 25 usual topics and 28 critical topics. Each topic provides learners with guiding questions, relevant vocabulary and idioms. IELTS speaking success also offers audio streaming and recording service so that learners can compare their pronunciation with native speakers.' To share learning, learners can directly email their recorded speeches, or they can register on a company-administered web forum or SNS.



[Figure 7] The Screenshots of IELTS Speaking Success

## (2) L2 Approaches and Methodological Concerns

The types of speaking practices are mostly drill and practice, for example, 'listening and repeating', 'reading aloud', or 'voice recording'. Some apps provide references only such as speaking tips, sample dialogue, or mouth movement videos. Learner-centered or interactive activities were not found. Another noticeable pattern is that the most of the lessons are form-focused. Only two apps have meaning-based content, such as job interview or selected topics from IELTS. There is no attempt to provide contextualized meaning exchanges among learners or between learners and texts. Furthermore, skills were not integrated actively to develop comprehensive speaking ability such as reading and speaking (2) or listening and speaking (responding). Only instruction for the development of bottom skills, such as sound, phoneme, dialogue practices were attempted.

## 6) Writing(5)

### (1) General Learning Features

Writing applications mostly have a very clear target group for young adults who prepare essays or take writing tests to enter university in English speaking countries. They present a series of tutorials of diverse essay types, such as college scholarship essays, SAT essays, summary essays and so forth.

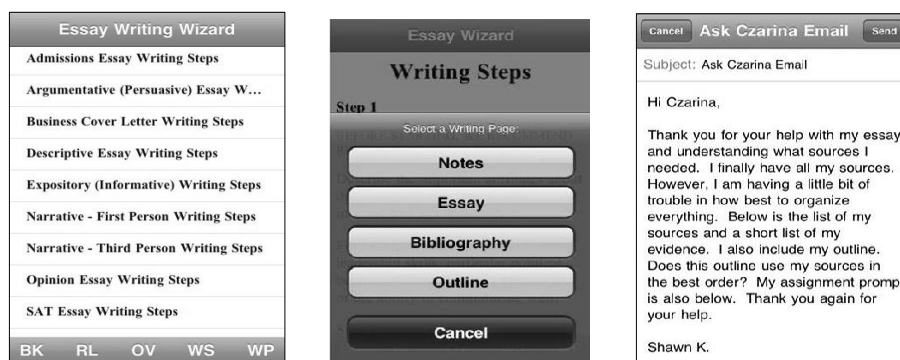
[Table 13] Content and Study Feature of Writing Applications

	Organization		Study Feature
	Essay Writing Tutorial	Essay Tutorial + writing pages	writing guideline
N	3	2	5
%	60	40	100

Instruction patterns in all the selected apps are similar and straightforward. They require comprehension and experiential learning and provide writing tutorials, writing, and a spell checker. Some apps additionally facilitate web dictionary, outline guide, or bibliography. *ESL Essay Writing* is one example of writing applications.

### (2) L2 Approaches and Methodological Concerns

Some applications effectively facilitate users with writing practices from various writing approaches, such as process writing, self-editing, interactive writing etc.. The writing process was systematic providing “brainstorm-outline-write-study with tutorials-revise-submit” steps. In addition, some applications attempt to provide an opportunity for self-editing based on email-based or web-based individual feedback and a reference guide. *Essay Writing Wizard MAX* is one excellent example. It consists of six different apps including writing planner, organizer, handbook, Q&A, and personal assistant. Learners can brainstorm on “Notes”, organize an idea on “Outline”, and write a draft on “Essay.” Learners use other apps on the writing process by reading tutorials, asking questions, or checking writing styles from the reference etc. Email or SNS service are actively used for one-to-one communication.

[Figure 8] The Screenshots of *Essay Writing Wizard MAX*

## V. DISCUSSION AND CONCLUSION

### 1. What are the common and distinctive features of ESL smartphone applications?

The analysis of ESL smartphone applications reveals several common features. First, the majority of applications deals with short language data information such as word lists, pronunciations, grammatical elements, or sample dialogues or essays etc. The development of vocabulary is the most common skill area ESL apps apply themselves to. This is not a surprising result because the phone screen allows the bite-size chunks of input rather than extended tasks or lengthy reading passages. Another reason might be that the mobile applications are still considered to function as study reference not as full instruction. Therefore, most of the apps present language learning of lexical level or facilitate the users with glossaries often including one-sentence examples or pronunciation sound files.

Second, most of them require cognitive language learning style and seldom provide socially interactive learning opportunity. Most instructions in vocabulary and grammar apps are drills, problem solving, recalling, comprehension checks to individually construct linguistic knowledge. The technology functions as resources (ex. word list, tongue twisters, sample writings, games) and tools (ex. dictionaries, a notepad, a voice recorder, a translator etc.), and it is up to the users to control them for developing new knowledge. This approach is very close to cognitive CALL (Kern & Warschauer, 2000). There is no full instruction that controls learners, but, rather, individualized, personal, analytic, learner-centered learning opportunities. There were few attempts to provide opportunities for collaboration with others or much attention given to engaging in authentic contexts or

extended discourses. Socially interacting technology, such as SNS, Wikis, and podcasting, were hardly employed for socio-cognitive CALL (Kern & Warschauer, 2000).

Third, ESL apps employ various modes and functions of multimedia, such as sounds, videos, musics, or images, for personal, perceptual, and field-independent learning while other mobile technologies such as SNS, podcasting, voice synthesizing, which clearly provide more collaborative, constructive, or field-dependent practice, are not actively used for instruction,

Fourth, their L2 approaches are not diverse and remain in the form-focused instruction. The data analysis of ESL applications across the skill areas shows that most of the apps are primarily form-focused. Two dominant methods are audio-lingual and task (test)-based. There were many authentic or extended discourses provided. Sound setup or voice recording tools were highlighted in many apps for repetition drills.

## **2. What are the strengths and weaknesses in utilizing present smartphone applications for effective MALL?**

As summarized in the literature (p. 34, Figure 1), effective MALL should assume a good mobility and also include benefits of MALL (p. 35). Currently available ESL smartphone apps have both strengths and weaknesses from the criteria indicated in the literature. First of all, the ESL apps seem effective in that they provide a personal and learner-centered learning opportunity with ubiquitously accessible and flexible resources and activities. This could encourage learners to develop a sense of individuality and develop life-long learning habits. Students can more easily and promptly access language learning materials and tools on their own anytime and anywhere; therefore, enhancing their language learning motivation and autonomy in MALL.

On the other hand, there is also substantial scope to improve ESL apps to reach effective MALL. They are weak in realizing mobility as a more situated, field-dependent, and collaborative learning opportunity. More active use of authentic context, socially interactive tasks, timely and situated materials (ex. podcasting) is needed. In addition, knowledge reconstruction based on social process should be also considered in designing instruction and implementing technology. The present apps facilitate personal learning, but do not effectively assist personalized learning. Although there seems a plenty of learner-centered learning opportunity by providing rich language data, including sound and movies, and test questions, they lack knowledge-building devices, such as hyperlinks, RSS, MoSoSo, CMS, and other web 2.0 tools.

Some more suggestions for instructional design were evident from the data analysis.

First, more varied and appropriate technology should be embedded in the technology to encourage development of other language skill areas. Recorder, speech recognizer, audio file controller, memo pad, course management services(CMS) could be more widely and properly utilized for developing productive speaking and writing skills. Second, more diverse L2 approaches and methodologies should be employed to satisfy the different needs and styles of learners. Despite good quality and quantity of input, their application and use are mostly based on a structural and cognitive focus.

Another critical limitation in MALL is high cost. Smartphones are costly so the users are generally working adults. There are three times more paid apps than the free ones, which, generally, are so-called “trial or lite versions” The price ranges vary depending on data capacity amount and the number of bells and whistles the devices feature.

This study shows the great potential of mobile language learning and reminds us of how swiftly mobile technology changes. The effective design and use of ESL mobile applications should continue to be studied in order to suggest the right direction to effective MALL.

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Key words: mobile-assisted language learning, smartphone applications, software evaluation, second language learning

Applicable levels: primary, secondary, tertiary

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Received: January 31, 2012

Reviewed: March 15, 2012

Accepted: April 15, 2012